- 42 -

## WHAT IS CLAIMED IS:

1. A fiber optic module comprising:

a connector for connection with a mother

board:

æ

 $\alpha$ 

a

 $\alpha$ 

a

0

a

0

lecer disde

LD electric signal conversion means for

converting serial data received from said mother board laser diste to an LD electric signal for a laser diode;

Paser dioda

laser diode an bb module for converting said bb electric

signal to an HD optical signal; α

photodiode PB-module for converting a photodiode

optical signal to a PB electric signal; ሌ

The clean signal conversion means for

glabatiole. That doll converting said PP electric signal to PP serial data;

a circuit board for carrying thereon said Paror chode

d connector, said be electric signal conversion means, shoiteatas

laser distance plate tiode said ED module; and

first and second frames for holding said circuit board, said HD module and said PD module, who to disão

wherein said connector is of a surface mounting type.

A fiber optic module as set forth in claim 1, paser diode ilustodiodo. wherein leads of said LD and PD modules are connected to a surface of said circuit board provided thereon with said connector.

A fiber optic module as set forth in claim 2, aser diale further comprising an to variable resistor for adjusting asser diode laser disde a drive current of said LD module and wherein said LD variable resistor is provided on a surface of said

circuit board opposed to said surface having said connector thereon.

A fiber optic module as set forth in claim 2. disto de ode further comprising a PD variable resistor for detecting Mutadrode thatodisde a signal of said PD module and wherein said PD variable resistor is provided on a surface of said circuit board opposed to said surface having said connector thereon.

A fiber optic module as set forth in claim 1, 9 Solbotaig wherein said PD-electric signal conversion means includes a plurality of semiconductor/ Hes.

A fiber optic module as set forth in claim 1, wherein said circuit board measures 17mm through 25.4mm wide, 30mm through and 50mm long.

7. A fiber optic module comprising:

a connector for connection with a mother

board:

a

a

11

(X

V.

1

near diade -LD-electric signal conversion means for

converting serial data received from said mother board loser diode Cx

to an LD electric signal for a laser diode;

an LD module for converting said LD electric laser sisse

signal to an LD optical signal; C

PD-module for converting a photodiode

optical signal to a PD electric signal;

Production means for Subtrained Conversion Means for Subtraine converting said PD electric signal to PD serial data;

o. a circuit board for carrying thereon said

Vascer diode connector, said to electric signal conversion means, laser disde vlotediode said be module and said Po module; and

- 44 -

first and second frames for holding said ໃນປະຊຸມ ໃນປະຊຸມ circuit board, said #B. module and said #B. module,

wherein outline dimensions of said fiber optic module are 19mm through 25.4mm wide, 45mm through 65mm high and 9mm through 25.4mm high.

A fiber optic module as set forth in claim 7, further comprising a casing, said casing comprising said first and second frames forms an outside casing.

A fiber optic module as set forth in claim 7, wherein said first and second frames are made of resin material.

ìφ.

a

O

 $\alpha$ 

0

a

TA.

A fiber optic module comprising:

a connector for connection with a mother

board;

Gest Mide to electric signal conversion means for

converting serial data received from said mother board MAN MASC to an LD electric signal for a laser diode;

Ask do de low do de an HD module for converting said HD electric

New dode signal;

an included signal; which was a photodiode a PD module for converting a photodiode

optical signal to a PD electric signal;

Protective signal conversion means for which we will be converted as a converting said and the convert

a circuit board for carrying thereon said how dide connector, said to electric signal conversion means, how dide

first and second frames for holding said face though the diode the circuit board, said ED module and said ED module,

45

wherein said module comprises mounting means for mounting said first and second frames to said mother board.

11. A fiber optic module as set forth in claim 10, wherein said mounting means includes a screw.

A fiber optic module as set forth in claim 11, further comprising a first frame openings provided in said first frame, a second frame openings provided in said second frame, a circuit board openings provided in said circuit board, and a mother board openings provided in said mother board, and wherein screws are inserted into said first openings, second frame openings, said circuit board openings and said mother board openings to cause said first frame, said second frame, said circuit board and said mother board to be mutually fixed.

A fiber optic module as set forth in claim 12, wherein said first frame openings is smaller than said second frame openings and said circuit board openings and said mother board openings have substantially the same diameter as said second frame opening.

A fiber optic module as set forth in claim 10, wherein said screws have an effective diameter of 1.3mm or more.

A fiber optic module as set forth in claim 12; wherein 3 of said first frame openings are provided in said first frame and said first frame openings are arranged to form a substantially isosceles triangle.

A fiber optic module as set forth in claim 12,



wherein said first frame openings are used also as reference holes for parts inspection of said first frame and said second frame openings are used also as reference holes for parts inspection of said second frame.

A fiber optic module as set forth in claim 11, wherein said screws are tapping screws.

A fiber optic module as set forth in claim 10, wherein pins erected on at least one of said first and second frames are used as said mounting means.

A fiber optic module as set forth in claim 18, wherein pins erected only on said second frame are used as said mounting means.

A fiber optic module as set forth in claim 19, further comprising first frame openings provided in said first frame, a circuit board openings provided in said circuit board, and a mother board openings provided in said mother board, and wherein screws are inserted into said first frame openings, said circuit board openings and said mother board openings to cause said first frame, said circuit board and said mother board to be mutually fixed.

A fiber optic module as set forth in claim 20, wherein said first frame openings are larger than a diameter of said pin and said circuit board openings and said mother board openings have substantially the same diameter as said first frame openings.

A fiber optic module as set forth in claim 19,

wherein said pin has a diameter of 1.3mm or more.

A fiber optic module as set forth in claim 19, wherein said pin is made of metallic material.

A fiber optic module as set forth in claim 19, wherein said pin is integrally formed with said second frame or press fitted therein.

wherein 3 of said first frame openings are provided in said first frame and said first frame openings are arranged to form a substantially isosceles triangle.

26. A fiber optic module as set forth in claim 20, wherein said first frame openings are used also as reference holes for parts inspection of said first frame and said pins are used also as reference holes for parts inspection of said second frame.

A fiber optic module comprising:

a connector for connection with a mother

board:

converting serial data received from said mother board to an LD electric signal for a laser diode;

When the module for converting said the electric and the module for converting said the electric

signal to an <del>LD</del> optical signal;

a PD module for converting a photodiode

optical signal to a re electric signal;

furtified the conversion means for the conversion means for the conversion means for the conversion said PD electric signal to PD serial data;

a circuit board for carrying thereon said

ø

K

00

O.

à



connector, said in diede LD, electric signal conversion means, said LD module and said

first and second frames for holding said

( ) first and second frames for holding said

( ) first and first module and said PB-module and said PB-module

wherein said circuit board is temporarily fixed to at least one of said first and second frames. A fiber optic module as set forth in claim 27, wherein said temporary fixing means is a snap-fit mechanism.

- A fiber optic module as set forth in claim 28, wherein said circuit board is temporarily fixed at an end thereof by said snap-fit mechanism.
- 30. A fiber optic module as set forth in claim 27, wherein an elastic arm is provided to at least one of said first and second frames and said circuit board is temporarily fixed to the other frame by said elastic arm.
- 31/ A fiber optic module as set forth in claim 27. wherein said circuit board is temporarily fixed at a front part thereof by a snap-fit mechanism and said circuit board is temporarily fixed to the other frame at a rear part thereof by an elastic arm.
- A fiber optic module comprising: 32. a connector for connection with a mother

board;

we disable the signal conversion means for converting serial data received from said mother board to an LD electric signal for a laser diode;

a module for converting said ba signal to an in optical signal; a

a PD- module for converting a photodiode (PD) shotodiode

optical signal to a PD electric signal:

Philippide conversion means for the electric signal conversion means for converting said to electric signal to PD serial data;

Connector, said TD electric signal conversion means, lare disde photodise said 50 module; and

first and second frames for holding said circuit board, said 50 module and said FD module,

wherein said module further comprises supporting means for tightening to fix said first and second frames and said mother board from their outer periphery.

A fiber optic module as set forth in claim 32, wherein said supporting means is made of metallic plate.

34/. A fiber optic module as set forth in claim 33, wherein said metallic plate is provided in its both ends with recesses and said recesses are rotated to tighteningly fix said metallic plate.

A fiber optic module as set forth in claim 32, wherein said supporting means is positioned at a position opposed to said in and PD modules.

سر36 A fiber optic module comprising:

a connector for connection with a mother

board;

electric signal conversion means for

a

æ

a

a

Æ

A ſλ



converting serial data received from said mother board aser disde a to an LD electric signal for a laser diode; Parer dlade a an LB module for converting said LB-electric lace dode signal to an be optical signa; 1 photodisde a a PD module for converting a photodiode motodisde. optical signal to a PD electric signal;  $\alpha$ photodiste PD electric signal conversion means for that diode a that Gode that dide converting said PD electric signal to PD serial data; m a circuit board for carrying thereon said Greek died & said LD electric signal conversion means, connector, said be electric signal configurations white discussions and Sp module; and ſλ a first and second frames for holding said lover diode  $\alpha$ circuit board, said LD module and said PD module, wherein said module further includes a cover for covering an externally exposed part of said circuit board therewith. 37/ A fiber optic module as set forth in claim 36, wherein said cover is made of resin material. 38/. A fiber optic module as set forth in claim 36, wherein said cover is made of metallic material. 39 A fiber optic module as set forth in claim 36, wherein said cover is made in the form of said first frame. A fiber optic module as set forth in claim 36, wherein said cover is provided therein with an opening. 41. A fiber optic module comprising: a connector for connection with a mother

5

board;

2 ectric signal conversion means for converting serial data received from said mother board a to an LD electric signal for a laser diode; Paser dindo laser didle an ED module for converting said ED electric  $\alpha$ signal to an ED optical signal;

The module for converting a photodiode optical signal to a PD electric signal; 1 a  $\alpha$ obstadiode ( > electric signal conversion means for harstingle converting said PD electric signal to PD serial data; a a circuit board for carrying thereon said

laske dbade

connector, said ID electric signal conversion means,

laske dbade

the dbade a a said LD module and said PD module; and

> first and second frames for holding said aser diode circuit board, said ID module and said PB module,

wherein said module further comprises indication parts indicative of a safety certification and a place of production provided respectively onto said first and second frames.

A fiber optic module as set forth in claim 41, wherein said indication part provided onto said first frame is opposed to said indication part provided onto said/second frame.

A fiber optic module as set forth in claim 42, wherein said first and second frames have a recess and said indication parts are provided to said recesses.

A fiber optic module as set forth in claim 41, wherein said indication parts are seal labels.

A fiber optic module as set forth in claim 41,

wherein said indication parts are provided integrally to said first and second frames respectively.

A fiber optic module comprising:

a connector for connection with a mother

board:

a

 $\alpha$ 

0

**N**A  $\alpha$ 

CX

(mer diale LD electric signal conversion means for

converting serial data received from said mother board Caser diade

to an LD electric signal for a laser diode;

user dide an LD module for converting said LD electric Paser Hode

signal to an optical signal;  $\alpha$ 

a PD module for converting a photodiode photodiode optical signal to a PD electric signal;

Phytodial conversion means for the electric signal conversion means for the total of C a converting said PB electric signal to PD serial data;

a circuit board for carrying thereon said laser disde Q connector, said to electric signal conversion means, said in module and said PR module; and

first and second frames for holding said vhotodiode Paser Llode circuit board, said LD module and said PD module.

wherein a data transmission rate of said optical signal is 130 Mbits/s or more.

A fiber optic module as set forth in claim 46, wherein the data transmission rate of said optical signal is 200 Mbits/s or more.

A fiber optic module as set forth in claim 46, wherein the data transmission rate of said optical sigral is 500 Mbits/s or more.

A fiber optic module as set forth in claim 46,

wherein the data transmission rate of said optical signal is 1000 Mbits/s or more.

59%

A fiber optic module comprising:

a connector for connection with a mother

board:

Œ.

Ø.

a

(h

a

a

m

0~

0~

a

Onser diode

LD electric signal conversion means for

converting serial data received from said mother board

to an ED electric signal for a laser diode;

an HB module for converting said AB electric

signal to an in optical signal;

a PD module for converting a photodiode

optical signal to a PB electric signal;

Photodisc PF electric signal conversion means for statistically converting said PD electric signal to PB serial data;

a circuit board for carrying thereon said lase dide connector, said LD electric signal conversion means, lase dide said LD module and said AD module; and

first and second frames for holding said

(bufy field limit to be circuit board, said to module and said to module,

wherein said fiber optic module further includes a module cap to be inserted into light outlet and inlet openings defined by said first and second frames along a light inlet and outlet direction.

A fiber optic module as set forth in claim 50, wherein said module cap has cap fixing means engaged with part of said first and second frames and fixed to at least one of said first and second frames.

52. A fiber optic module comprising:

54

a connector for connection with a mother board; a LD electric signal conversion means for converting serial data received from said mother board Coser diade to an TD electric signal for a laser diode: ø leser diode an LD module for converting said to electric a signal to an LD optical signal; a an more production of the prod D optical signal to a PB electric signal: S) PD electric signal conversion means for 3 converting said PD electric signal to PB serial data; a a circuit board for carrying thereon said a

connector, said LD electric signal conversion means,

LAN diede Photodielle; and
said LD module and said PD module; and

first and second frames for holding said

(MA) & Watodio()

Circuit board, said #9-module and said #9-module

wherein said fiber optic module includes a shielding member for shielding at least one of said to the shielding and PD modules.

wherein a shielding plate for exclusive use of said to module and a shielding plate for exclusive use of said to module and a shielding plate for exclusive use of said to the body and the body and the body and the body and the body are to be a said to the body and the body and the body are to be a said to be a said

A fiber optic module as set forth in claim 52, wherein at least one of said first and second frames is provided integrally with a shielding plate.

A fiber optic module comprising:

a connector for connection with a mother

55

 $\alpha$ 

 $\Gamma$ 

a

55.

 $\alpha$ 

board:

á

O

a

a.

2  $\alpha$ 

a

a

ſ٣

æ

Paser diode LD electric signal conversion means for

converting serial data received from said mother board

to an to electric signal for a laser diode;

New dode legy dodle an to module for converting said LD electric light diode signal;

an ED Creater who will have the disable signal:

optical signal to a PD-electric signal:

phit dode TD electric signal conversion means for Matschoole photodical converting said PD electric signal to PD serial data;

a circuit board for carrying thereon said book dide connector, said AD electric signal conversion means. later hade the thought and said ID module; and

first and second frames for holding said laxer diode . ohalbotaiki circuit board, said bo module and said Po module.

wherein elastic pawls to be engaged with an optical fiber plug are provided to at least one of said first and second frames and said pawls are provided at their root parts with first projections extended toward the other frame.

**86**. A fiber optic module as set forth in claim 55, wherein second projections for protecting said first projections are provided to an opposite frame being opposite to the frame provided with said first projections.

157. A fiber optic module as set forth in claim 55, wherein said first and second frames and said pawls are made of resin material.

- 58. A fiber optic module comprising:
- a connector for connecting with a mother board of a computer;
- a first semiconductor integral circuit for converting a first parallel data provided from the mother board into a first serial data for a laser diode;
- a second semiconductor integral circuit for converting said first serial data for the laser diode converted by said first semiconductor integral circuit into a first electrical signal;
- a laser diode module including a laser diode for converting said first electrical signal for the laser diode into a first optical signal of the laser diode;
- a photodiode module including a photodiode for converting a second optical signal received by said photodiode into a second electrical signal of the photodiode;
- a third semiconductor integral circuit for converting said second electrical signal of the photodiode into a second serial data of the photodiode;
- a fourth semiconductor integral circuit for converting said second serial data of the photodiode converted by said third semiconductor integral circuit into a second parallel data;
- a circuit board for furnishing with said connector, said first semiconductor integral circuit, said second semiconductor integral circuit, said third

semiconductor integral circuit and said fourth semiconductor integral circuit;

a first shielding plate for electrically ſκ shielding said LD module;

a second shielding plate for electrically shielding said PB module;

 $\alpha$ 

a first frame for holding said circuit board, her diale That dock said in module and said in module; and 6~

a second frame for cooperating with said first frame to hold said circuit board, said in module and what holds

æ

 $\alpha$ 

